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SOFT DRINKS □ BEER □ BOTTLED WATER □ WINE □ POWDERS □ JUICES □ SPIRITS

NOVEMBER 19, 1982

Beverage Industry

MARKETING □ DISTRIBUTION □ TECHNOLOGY

A HBJ PUBLICATION

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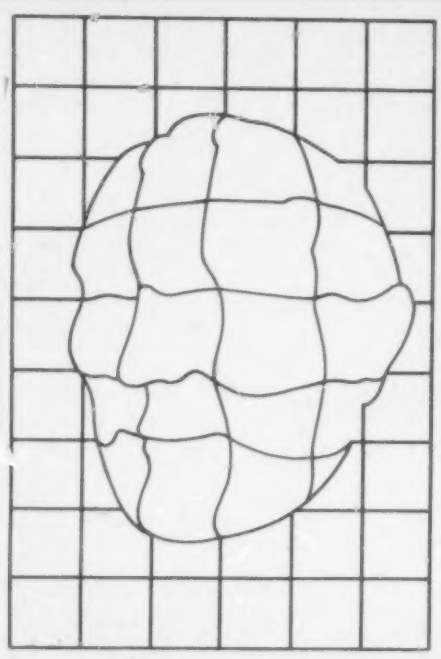


PROFITS

NSDA ANNUAL MEETING
AND INTERNATIONAL BEVERAGE
INDUSTRY EXPOSITION

NOVEMBER 30—DECEMBER 2, 1982
GEORGIA WORLD CONGRESS CENTER
ATLANTA, GEORGIA

See Special Section, page 57

BI Week

• Fred Adamany, president, Royal Crown Cola, has been selected as the 1983 *Beverage Industry* Man of the Year. Adamany will be featured in the December 3 issue and will be honored at this year's NSDA/InterBev meeting.

(Continued on page 159)

Issues without answers await action in Congress

WASHINGTON, DC—As the beverage industry reflects on this past year—the midway point of the Reagan administration—one thing comes to mind: there has been much activity, but few accomplishments as yet.

Be it the questionable status of plastic bottles, food safety, sodium labeling or exclusive territories for beer wholesalers, the industry has watched hearings and proposals surface, but no concrete policies emerge. Nevertheless, the movement that has occurred has leaned in favor of beer, wine and soft drink makers.

For years, the beverage industry has sought government approval for a variety of plastic bottles, whose status has been in abeyance as batteries of scientific tests were conducted to assess potential carcinogenicity. Now there appears a glimmer of hope that PET usage may be extended and acrylonitrile (AN) and polyvinyl chloride (PVC) containers will gain marketing approval. However, a few obstacles may still be down the road.

At presstime, it seemed that PET liquor bottle approval by the Bureau of Alcohol, Tobacco and Firearms (ATF) was imminent. The bureau had completed an environmental assessment which

(Continued on page 124)

NSDA launching major push to promote InterBev '84

NEW YORK — Although the National Soft Drink Association announced the development of InterBev last year and this year's show carries that title, the 1984 InterBev will be the first to fill the full brunt of the association's direction.

In mid-October a group of four U.S. beverage industry executives, including Thomas F. Baker, former NSDA executive director, left for Europe to begin promoting the InterBev Exposition and World Congress. Announcement of the InterBev push was made here recently by Dwight Reed, NSDA president.

(See "InterBev fullfills needs of international producers," by Thomas F. Baker, page 55.)

The exhibition will be the first in the U.S. to encompass all types of beverages—wines, spirits, beers, soft drinks, bottled waters, fruit juices and juice drinks. It will also be the first congress held anywhere to consider the technology and business methods needed for all types of beverages. *(See this year's InterBev seminar section, page 65.)*

"Although multiple beverage exhibitions have been produced overseas, none have ever been staged in this country," Reed pointed out. "As for the congress, that is entirely new. No such congress, covering all beverages, has been convened anywhere."

The first full-fledged InterBev will be at McCormick Place, Chicago, Nov. 12-16, 1984. Others will follow in the soon-to-be-completed Con-

(Continued on page 54)

Expect FDA aspartame decision 'shortly'

WASHINGTON, DC — Searle & Co. should "hear something" shortly from the Food and Drug Administration (FDA) on its petition to allow aspartame use in carbonated beverages.

The manufacturer filed the petition in late August, and FDA has 90 days in which to respond, although that period can be extended another 90 days if the agency seeks more data from the company.

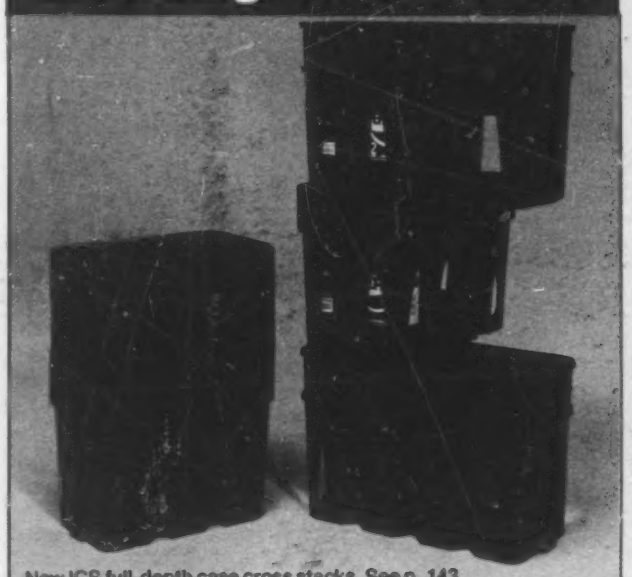
FDA already has information on aspartame's safety and toxicity based on its approval of the low-calorie sweetener last year for tabletop use. Searle recently started marketing NutraSweet (the trade name for the bulk product) in powder form for this purpose under the name Equal.

As for aspartame's potential use in soft drinks, FDA is now reviewing Searle-submitted data on consumption levels and stability. "Aspartame remains acceptably sweet to consumers for at least six months in most soft drinks and up to one year in some flavors," said Richard McGraw, Searle vice president for public affairs. "And the soft drink industry usually measures turnover in a matter of days." Canada has marketed aspartame-sweetened soft drinks for the past year.

The low-calorie sweetener is currently manufactured in the United States and Japan, and used in several other foreign countries. But it is "significantly more expensive than other sweeteners be-

(Continued on page 52)

BI Package of the Week



New ICS full-depth case cross stacks. See p. 143.

SOFT DRINKS □ BEER □ BOTTLED WATER □ WINE □ POWDERS □ JUICES □ SPIRITS

NOVEMBER 19, 1982

Beverage Industry

MARKETING □ DISTRIBUTION □ TECHNOLOGY

An HBJ PUBLICATION

Hot filling aluminum cans with liquid nitrogen system

HONOLULU, HAWAII—Hot-filled non-carbonated fruit juices are being packaged for the first time in lightweight two-piece, D&I aluminum cans using liquid nitrogen. Pioneers in this new venture in beverage packaging are Reynolds Metals Company and Hawaiian Sun Products.

The use of Reynolds Liquid Nitrogen Injection Systems enabled Hawaiian Sun to convert from steel cans to aluminum cans for its tropical fruit juice products. The package change initially affects six juices, and the remaining nine products in the Hawaiian Sun line will be converted to aluminum before the end of the year.

"We wanted to make the switch to the more modern aluminum cans because we know they have unique advantages for consumers," said David Kurihara, president of Hawaiian Sun.

"People especially like the recyclability of aluminum cans. Consumers know that by recycling aluminum they can earn money, protect the environment and save energy. That's very important in Hawaii," he said.

"Another reason for offering our products in aluminum cans is that they offer many convenience advantages and are very appropriate for outdoor activities," said Kurihara.

Nitrogen injection gave Hawaiian Sun a new look aluminum package.

The technical service group

(Continued on page 129)

Del Monte intros juice in 1-L aseptics

SAN FRANCISCO—Del Monte Corp. located here, recently introduced four flavors of pure fruit juice packaged in 1-L aseptic cartons.

The "Taste Fresh" carton is being test marketed in seven cities, supported by a comprehensive advertising and consumer promotion program. Those cities are Indianapolis, Marion and Evansville, IN; Norfolk and Richmond, VA; Pittsfield, MA, and Albany, NY.

The four juices—apple, pineapple, pineapple-orange

(Continued on page 129)

Beverage container usage increases in 2nd quarter

CLEVELAND, OH—Because of near record interest rates and high unemployment in 1982, overall corporate earnings in the U.S. container industry should be down versus 1981. However, some companies have positioned themselves well for 1983; new products and processes should help boost demand and profitability.

In his latest progress report on the container industry, Arthur Stupay, market analyst at Prescott, Ball & Turben, located here, notes that in the first six months of 1982, interest rates forced considerable inventory liquidation of processed foods and other products, which reduced demand for metal cans. Also, high unemployment hurt beer and soft drink sales, which further affected demand for containers.

Total glass container ship-

(Continued on page 140)

Container shipments

	First quarter		% Change	Second quarter		% Change
Glass containers	1981	1982		1981	1982	
(Thousands gross*)						
Food	23,224	23,440	.9	21,599	23,101	7.0
Beer	25,700	26,488	3.1	32,647	29,495	(9.7)
Beverage	12,873	13,035	1.3	17,218	17,659	2.6
Liquor	4,159	3,373	(18.9)	3,960	3,609	(8.9)
Wine	2,331	2,108	(9.6)	2,149	2,193	2.0
Other	7,577	6,739	(11.1)	6,901	6,505	(5.7)
Total	**75,864**	**75,183**	**(.9)**	**84,474**	**82,562**	**(2.3)**
(*144 units in a gross.)						
Metal containers						
(Million cans)						
Food	6,532	6,493	(.6)	6,540	6,113	(6.5)
Beer	6,718	7,533	11.0	8,645	8,618	(0.3)
Beverage	5,367	5,551	(1.5)	7,336	7,737	5.5
General Packaging	1,135	985	(13.2)	1,158	955	(17.5)
Total	**19,752**	**20,582**	**4.1**	**23,679**	**23,423**	**(1.1)**
Plastic bottles						
(Million units)						
Beverage	546	487	(10.9)	362B	356B	(1.6)
Other	3,078	3,093	.5	2,081	1,900	(8.7)
Total	**3,625**	**3,580**	**(1.2)**	**2,443**	**2,257**	**(7.6)**

Note: B is data for April and May only.

Weibel Vineyards markets four wines in six-packs

MISSION SAN JOSE, CA—Weibel Champagne Vineyards, located here, is marketing wines in six-packs of single service bottles.

The company is selling the packages, called "Little Getaways," in convenience stores in California, Colorado and Hawaii, after a rollout in San Francisco in June, according to Peter Wolf, senior vp, marketing.

Rose, chablis, champagne and burgundy are the premium wines offered. The bottles, supplied by Glass Container Corp., contain 187 ml, or 6.3 oz.; 30 mm Alcoa Roll-On Pilferproof aluminum closures are supplied by Latchford Packaging Co., San Francisco.

The six-pack paperboard carriers are from Mead Packaging; the labels are made by Smurfit Diamond Packaging Corp.

Weibel Champagne Vineyards plans next spring to extend the market area to New

(Continued on page 139)

Weibel tries six-packs to boost sales.

Contents

Recession pulls down container profits

High interest rates and unemployment have caused profits in the container industry to drop below the 1981 rate. However, new products and processes are expected to boost demand and profit in the near future. Detailing the reasons for the container industry's poor showing in 1982 was Arthur Stupay, analyst for Prescott, Ball and Turben. For more detailed information and statistics on the container industry, see **page 4.**

Canada Dry changes mkting, bus. strategy

Canada Dry will be revamping its marketing and business strategy for 1983, and beyond. The new advertising program calls for $15 million to be spent in 1983, and for continued support through 1987. Included in the revamp will be the repositioning of ginger ale as a major soft drink, building national distribution for sugar free ginger ale, positioning club soda as "the perfect diet soft drink", and holding its lead in the mixers category. For more details on Canada Dry's advertising and business plans, see **page 8.**

Getting the most out of your consultant

Do you need a consultant to help with some phase of your bottling operation? If the answer to that question is yes, you're certainly not alone. Many industry experts feel that the days of the 'Jack of all trades' bottler are gone forever, with today's industry executive needing the help of CPA's investment bankers, operational consultants, attorneys, tax experts, advertising agencies, et al. Since these consultants are readily available, the question is not how to get them, but, how to get the most out of them. Read more about it on **page 22.**

Pepper's meet to discuss future

"Dr Pepper's taste made a Pepper out of me" is the new ad theme to go along with Dr Pepper's advertising and support program. The theme was unveiled at the compa-

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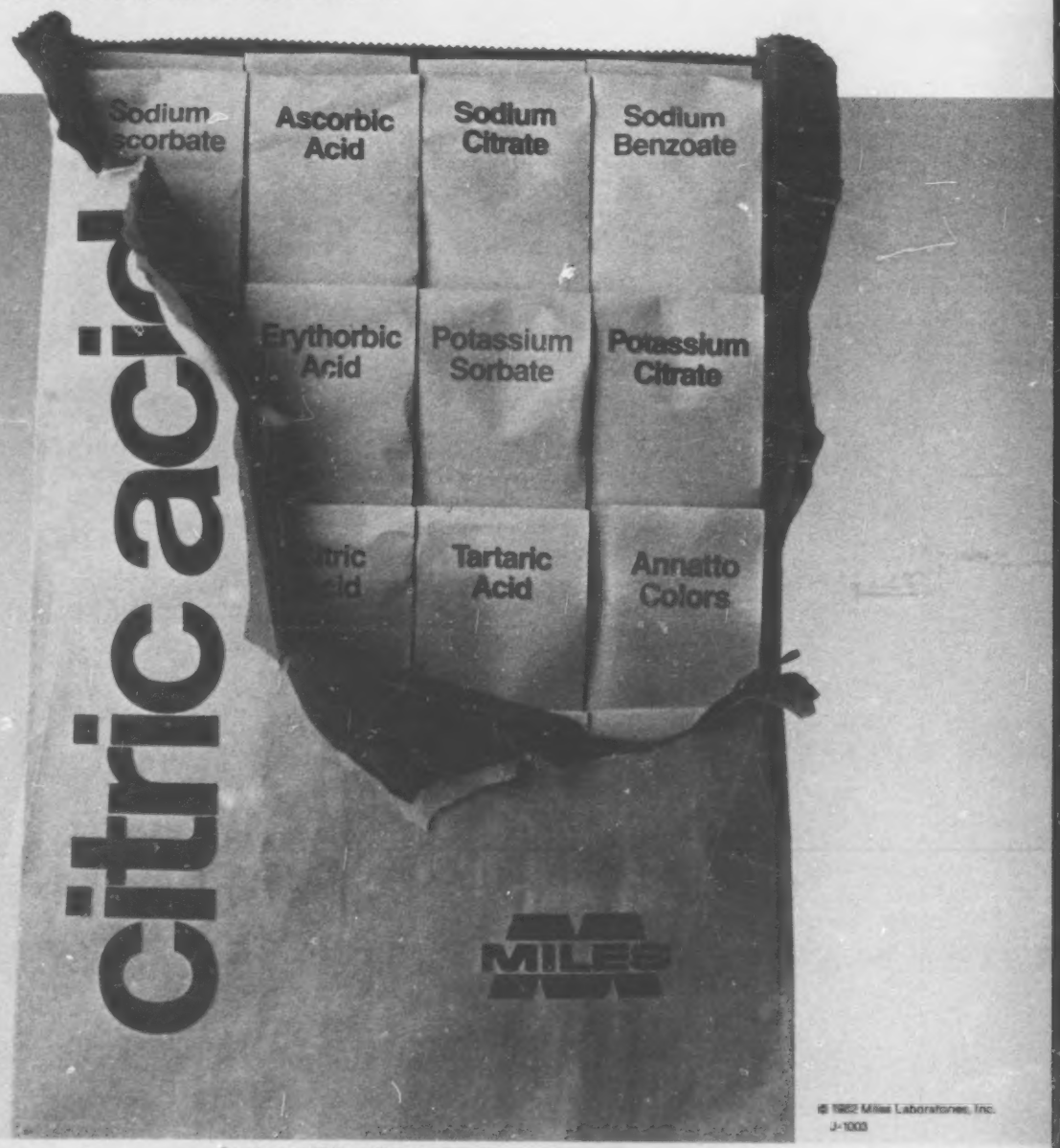

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Analysis of distribution costs via matrix systems

By **William E. Hardy, Jr.** associate professor of agricultural economics, **Auburn University,** AL.

The control of costs associated with the shipment of raw materials and finished products is a constant concern of transportation management. High fuel prices, escalating wage rates, and increasing expenses associated with acquiring and maintaining vehicles make efficient fleet operation a necessity if transport costs are to be controlled.

Technology has been available for many years to assist management in the design, evaluation and improvement of transportation networks. This is particularly true of techniques related to solving vehicle routing and scheduling problems. Many applications of these procedures indicate that transportation cost savings of 10% to 20% could easily be expected.

the problem

The major data requirement necessary for all routing analyses is a cost matrix. This matrix relates all stops to each other and to the distribution center. Travel distance is normally used as the unit of measure for this matrix. Various methods have been proposed to assist in the development of these data and even though some are very efficient, the task is still very time consuming and costly. With most procedures, calculation time expands exponentially as the size of the problem increases.

The effort and expense required for deriving the distance matrix makes many route managers reluctant to use computer-assisted route analysis. This aversion is particularly strong if the route network being considered has a large number of customers and the list of customers is highly variable, i.e. a service area in which new customers are constantly being added, while others are being lost. For analyses to be valid, new distance matrices would have to be constructed for each new set of customers. Any transportation cost reductions realized from the routing analyses could easily be lost through the expense of the analyses themselves.

the procedure

The case study analysis presented in this report illustrates a procedure for generating the distance matrix which should conserve time and be cost effective for large and even the most highly variable transportation network. The basic concept used is to overlay maps of the total service area with a grid. Use of a grid system is not new to anyone who works with maps. It is, however, somewhat unusual that it be used in vehicle routing and scheduling problems. Many researchers and practitioners who work in the area tend to feel that a grid system is not precise enough to give good routes. Research results presented later in this report indicate that their judgements of grid-based analysis are not necessarily valid.

The basic procedure fol-

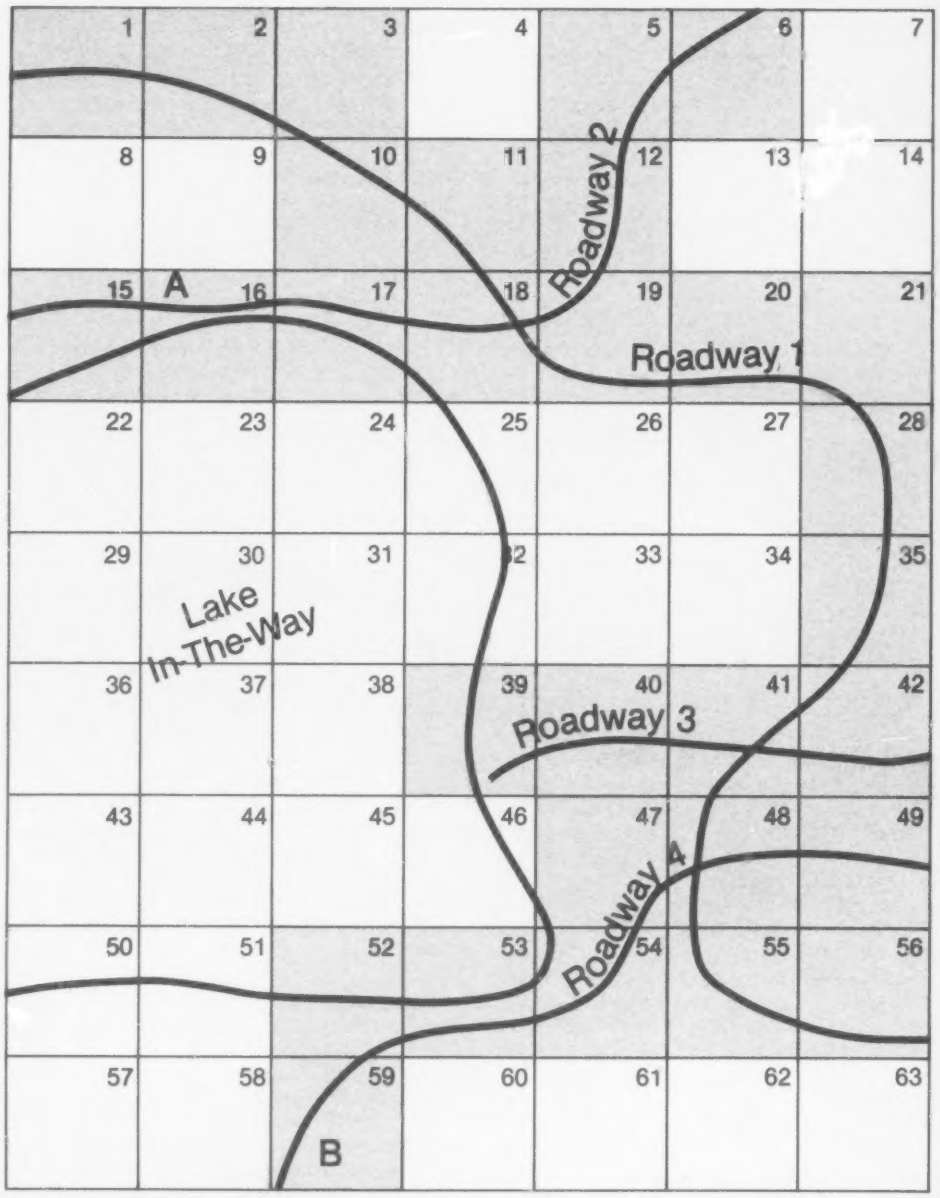

Table 1.
Data describing improved systems using actual customer locations and grids based on quarter-mile, half-mile, and mile scales for case study firm.

	Actual locations		Quarter-mile grid		Half-mile grid		One-mile grid	
	initial reroute	improved reroutes[2]	initial reroute	improved reroutes[3]	initial reroute	improved reroutes[3]	initial reroute	improved reroutes[3]
Number of routes	8	8	8	8	8	8	8	8
Total distance (miles)	336.27	334.82	400.7	358.2	431.35	358.4	416.4	372.4
Total service time (hours)	66:23	66:22	67:39	66:55	68:30	67:04	67:59	67:12
Total cost (dollars)	1575.82	1553.54	1682.04	1574.23	1692.09	1576.73	1681.22	1586.03
Cost/unit delivered (dollars)	1.47	1.45	1.57	1.47	1.58	1.47	1.57	1.48
Total number of grid cells	564		2,447		826		244	
Setup cost[1]	77.60		2402.50		150.40		17.70	
Grid cells for analysis	564		173		102		55	
Run cost[1]	983.40	35.40	882.90	46.81	95.20	32.70	17.10	19.70

[1]Figured at a rate of $10.00/CPU minute on an IBM 3031.
[2]One additional reroute was run.
[3]Three additional reroutes were run.

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About the author

William Hardy

William Hardy is an Associate Professor of Agricultural Economics at Auburn University. He is involved in teaching and research with emphasis on the application of quantitative techniques to solving business problems. He is a native of Virginia and received a B.S., M.S. and Ph.D. from Virginia Tech. In addition to his work at Auburn University, Hardy has consulted with several firms on the design and operation of their delivery systems.

lowed in establishing the foundation for calculating the distance matrix is as follows:

First, a map or set of maps is obtained which cover the entire service area for the transportation system under study. The analysis is made a great deal easier if all maps have the same scale.

Next, a grid size must be established. Obviously, as the grid size is decreased, the grid distance network will more accurately represent the actual distance matrix. Also, with smaller grid sizes, the number of grid cells for a given service area is larger. As the number of cells increases, computation time for generating the distance matrix and for utilizing the matrix for actual analyses also increases. As pointed out earlier, this rate of increase is usually exponential.

The next step in the formulation of the distance matrix is to remove all grid cells that do not contain either a current or potential customer or relevant roadway. The shaded map cells illustrated on Figure 1 indicate which grid cells would be kept for use in establishing the distance matrix.

Elimination of unnecessary grid cells accomplishes two purposes. First, the distance matrix developed from the grid network more accurately follows the actual road network. For example, if all cells were left in the map illustrated in Figure 1, then the shortest distance between points A and B, using a one mile grid, would be 7 miles. The actual distance, however, since travel around the lake is required, is 15 miles.

The second advantage of removing cells is that the total number used for the analysis is reduced. For the example illustration in Figure 1 the 63 grid cells for the total map have been reduced to 30, thus reducing computational time and computer storage requirements.

matrix generated

After the total service area has been mapped and identified with a grid network, including all current and potential customer sites as well as relevant travel paths, the distance matrix may be generated. This dataset should be stored on the computer in an easy to access permanent form so that it may be utilized for each routing analysis.

Each routing analysis would be initiated by a preprocessing computer program which would establish the relevant distance matrix for the customers being analyzed. Each customer record would identify the map cell location for that customer. The preprocessing program would identify all map cells that were needed and construct the appropriate distance matrix for the routing analysis. Construction of this matrix requires a simple search of the total distance matrix for the service area. This process is significantly less time consuming and costly than the generation of a completely new matrix for each analysis.

research results

The distribution system of a bottled water distributor located in a major city was chosen for analysis to compare routing results obtained by using actual customer locations and several different size grid systems.

Management of the case study firm indicated that its customer list was very large and dynamic and that, in addition to its work load constantly increasing, it might experience a 30% turnover in customers during the year. With such extensive changes being expected, it would not be feasible both from a time and cost viewpoint to use computer-assisted routing if a new distance matrix had to be calculated for each new set of customers. The use of a grid system to calculate a master distance file appeared to be the most viable alternative.

It was also felt that the delivery system of the water distributor would be a good test on the value of the grid system for routing analyses because of the relatively dense customer population. With customers located close together, the likelihood for error in the specification of travel distance with a grid system is greater than if the customers are widely dispersed over a large geographic area.

Two separate sets of analyses were used to permit an evaluation of the merits of using a grid to construct the distance matrix. For the first analysis, a list of 564 customers that were being served out of one distribution center of the company were plotted on a map of the service area. Both residential and business customers were served, with demand ranging from one bottle of water for many individual homes to 29 bottles for the largest commercial customer. Water was delivered on a vehicle with a maximum capacity of 150 bottles.

Table 2.
Route results using half-mile and one-mile grid scales for case study firm.

	Half-mile grid	One-mile grid
Number of Customers	3,507	3,507
Number of Routes	56	55
Total Distance (miles)	2,770	2,735
Total Service Time (hours)	389:25	384:24
Total Delivery Cost (dollars)	10,005	10,244
Total Number of Grid Cells	304	112
Total Cost for Analysis[1] (dollars)	338.20	82.40

[1]Figured at rate of $10.00/CPU minute on an IBM 3031

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November 19, 1982

Data describing several improved systems developed through computer assisted routing are presented in Table 1. As indicated previously, the normal procedure for route analysis is to pinpoint the actual location of each customer and generate a distance matrix which accurately represents the true distances connecting each customer to all other customers and to the distribution center. This was accomplished for the 564 customers with the hope of establishing the best possible delivery system.

The initial reroute established eight routes. The total cost for serving these routes was $1575.82; this total is based upon driver base pay and fringe benefits of $17.12 per hour, overtime of $15.95 per hour, daily fixed cost of each truck at $15.22 and a cost per mile of $.51. One additional reroute (with some manual adjustment as is required in most analyses) was run which generated additional minor improvements in mileage, time and cost.

analysis cost

A somewhat disappointing feature of the results using actual locations was the cost of the analysis itself. First, the distance matrix, which represented the 564 stops, had to be generated. Using very conservative computer rates, this expense was $77.60. It should be remembered that this distance matrix is only good for the particular set of 564 customers used in the analysis. In addition, the cost for the initial route analysis was $983.40 and the manual reroute was $35.40. Nearly 90% of the cost of the initial route analysis was devoted to the actual design of routes. With 564 cells to consider, the number of possible route alternatives was extensive.

The delivery system was analyzed using three different grid scales—quarter-mile, half-mile, and mile. In all cases, eight routes were established. Also, total delivery costs were nearly as good as was obtained when actual locations were used. Major differences, however, are seen when the costs of the analyses are compared.

Major differences are seen when the costs of the analyses are compared.

First, a look at the setup costs. With the quarter-mile grid scale, nearly $2,500 of computer time was required to generate the distance matrix. This distance matrix, with 2,447 cells, covered the entire service area and represented all current and potential customer locations and travel alternatives. It would never have to be generated again and would be available for all subsequent analyses of that service area.

The number of cells required to cover the total service area was a great deal smaller when the grid size was increased to half-mile. A total of 826 map cells required a computer cost of $150.40 to generate. The 244 cells needed for the one-mile scale cost only $17.70 to construct.

The cost for the routing analyses also declined significantly as the size of the grid cells was increased. A major portion of the time required for the initial quarter-mile reroute was spent in searching the large distance data matrix to find the appropriate elements for the 173 cells in which the customers were located. The portion of the cost for actual route design was relatively small. With the half-mile and one-mile grids, the cost of the analysis was reduced significantly. These relatively inexpensive route results would make frequent route re-evaluations cost effective.

The route costs illustrated in Table 1 are those directly related to vehicle ownership and operation. When customer demand and the list of customers to be served changes a great deal, additional cost must be allocated to the time spent by management in designing routes. If a manual approach is used, one or more individuals may be required to work continuously in route re-evaluation.

With implementation of computer-assisted routing analysis; however, the time required for designing a delivery system will likely be reduced significantly. This time savings would leave management free to accomplish other important tasks or to do more in depth analyses of their transportation networks.

The second set of analyses was completed to gain insight into potential cost savings available from using different grid sizes on a very large problem. For this analysis, data for the same service area of the bottled water company were used. In this example, however, the total number of customers analyzed exceeds 3,500.

Computer storage requirements and projected analysis times prevented an examination of routes using actual customer locations and the quarter-mile grid. Results using half-mile and one-mile grids are presented in Table 2. Again, route results were very similar, but the costs of analysis were significantly different. Analysis cost data indicate that the one-mile scale, for this case study firm, would likely give the best operational system.

The costs (both time and computer expense) associated with routing analyses of transportation systems having a large and variable set of customers are likely to be high since a new distance matrix would be required for each customer list. One approach for solving the problem of having to recompute the distance matrix each time the list of customers changes would be to use a grid system. A distance matrix of this type would have to be calculated only once and could be utilized repeatedly for additional routing analyses. Access to this database would significantly reduce the time and cost for each routing analysis.

Information given in this report permitted a comparison of the route statistics for improved delivery systems developed using actual customer locations and three different grid scales. Routes (after minor manual adjustments) were close to the same using all procedures.

Significant differences were seen, however, in the costs for the analyses. Solutions using actual customer locations and a quarter-mile grid had costs which were relatively high. With half-mile and one-mile grids; however, the costs for route analysis were reduced to very low levels.

Research results presented by others have stressed that the clustering or grouping of the customers that will be included on a route is as important as the actual sequence of service on the route when minimizing cost. The results of the routing analyses presented in this report tend to verify that premise. The use of a grid network for establishing the distance matrix does some of the clustering before actual route analysis begins. The resultant smaller number of cells greatly reduces the expense of analysis with little loss in improved routing efficiency.

The results of the analyses presented for this example case study firm imply the value of using the grid approach for solving other routing problems. Since the results for this firm with its relatively dense customer population were good, then it would be reasonable to expect similar success for other firms. This would be particularly true for firms having a larger distribution area with sparsely located customers.

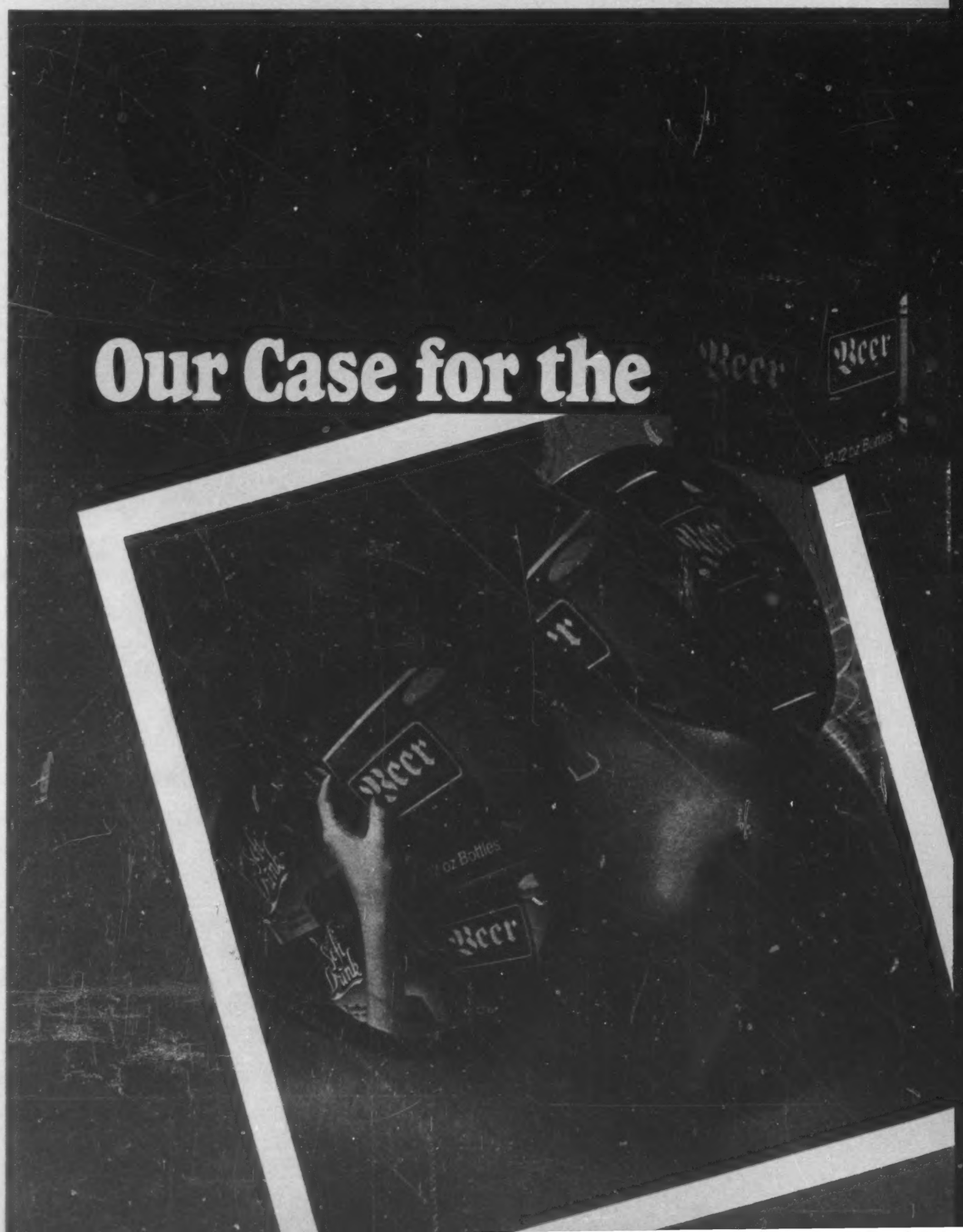
The size of the grid scale for additional analyses should be carefully selected to balance the trade-offs between decreased routing accuracy and savings in analysis cost.

Forest Girl wine gets 4-color P-O-S display

LAUDERDALE LAKES, FL—Baden Black Forest Girl wine has been given a new four-color carton and header display by Wineland Baden Imports, located here.

This new point-of-sale merchandising item, which the company hopes will be an eye-catcher, is currently being made available to retailers of the medium-dry wine.

Designed with retailers in mind, the card slips into the wine shipping case, and has a space where the retail price of the wine can be shown. The case card is available immediately and the new shipping carton will be used for all future shipments from Germany.



Portable route systems provide data to make strategic P-O-S decisions

By **Jeff Novak,** beverage industry marketing manager, **Norand Corp.**

Today's beverage industry executives must use an information management system that provides key sales and marketing information to formulate strategies and control tactical execution at the point-of-sale.

Beverage industry leaders are turning to portable route systems such as the Routecommander data system by Norand. Portable computer terminals in the hands of route persons provide the best tool for linking the industry executive to the point-of-sale.

Detailed and summary sales information is captured daily by customer, customer-type, package, brand and route. Information regarding promotional allowances by customer, customer-type, package, brand and route is also collected, as well as servicing of accounts according to frequency, time between outlets and profitability by stop.

From this data analytical reports become available on the host computer for strategy formulation. Examples of these reports include competitive sales by customer, customer-type, package, brand and route for this month to last month, year-to-date versus last year-to-date and promoted versus non-promoted. The host computer system should be configured to accommodate a minimum of two years sales history, maintain flexible report formats and allow extensive on-line inquiries into the data base.

A portable computer system also furnishes the control to execute tactics of the marketing strategy. For example, a strategy may be to increase market share of a particular package to chain stores. Tactically, this is done through a promotion allowance. Since a portable computer terminal applies the discount to that product at the point-of-sale, itemizes the transaction in data storage, controls the effective dates of the promotion and applies them to the proper customer, management can now precisely control the proper execution of the tactic.

Using the information collected, the strategy is analyzed the next day for its effectiveness at the point-of-sale. Did volume increase enough to offset lower margins? Did non-promoted package volumes increase? Did volume continue to increase with a longer duration for the promotion?

Control is also essential to effective tactic execution. The industry executive no longer just manages the business, but uses the portable computer system to control decisions at the point-of-sale.

The portable computer terminal, though, is more than a tool for collecting daily sales information. There are numerous benefits of the system that are just as important, and justify on their own the capital expenditure for the system.

Daily route analysis is an important derivative of the information collected by a portable computer system. Stop frequencies are analyzed for profitability. Low volume accounts are pinpointed for less frequent service. Seasonal account servicing is increased or decreased according to sales history. From sales, odometer and time stamp data, routes can be restructed more efficiently according to distance, volume and frequency. Vehicle operating costs and statistics can be correlated to route-types and efficiencies.

Route settlement accounting is reduced from 30-45 minutes to about 15 minutes. Daily zero cash settlement assures the driver against surprises and eliminates the need to carry overages and shortages. Sales commissions are calculated directly from the information captured from each salesman's terminal. Missing sales tickets no longer occur.

Vending machine accounting is also controlled by the system. The information collected provides sales, frequency and profit of each machine by location.

Customer satisfaction is increased by the progressive and professional approach from the sales person to provide accurate, computer-generated invoices for product delivery. Sales, promotional allowances, deposits, empties and tax are itemized on an easy to read invoice. No longer are tickets re-extended. Invoice errors become a rare occurrence.

Drivers are major benefactors of the system. They can literally work each day without using a pencil. A portable route computer is reinforcement of their importance and professionalism. It removes their paperwork headaches and allows them to concentrate on servicing their accounts.

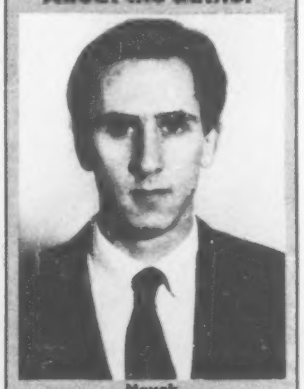
. . . and the list goes on from reducing data entry equipment to integrating inventory, accounts receivable and payroll data entered at the point-of-sale.

The challenge in the coming years is to implement a system to provide sales and market information, and enhance productivity at the route level.

Information technology, through portable route computers, is the tool for the industry executive to formulate market strategies and implement tactics at the point-of-sale to increase market share and profitability. As more and more retailers employ computerized scanning systems to capture sales data, the pressure increases upon the bottler to do the same to maintain the direct sale advantage of merchandising and space management.

The benefits of the system are directly proportional to management's commitment to use the information and control it provides. Portable computer systems put growth-minded bottlers in a stronger position to increase market share and net earnings in a highly competitive market. They must recognize the substantial return on their investment and make the capital expenditure.

About the author



Novak

Jeffrey M. Novak, who joined Norand Corp. in October 1978, is the beverage industry marketing manager for the Portable Products Division. His responsibilities include identifying and analyzing the use of portable computers for conventional and pre-sale distribution strategies. Novak works as a liaison with the relevant government agencies and industry associations. He also coordinates the development of new product offerings to meet the needs of the beverage industry.

Japanese beer shipments up 2% in '81, reaches 1.2 m gallons; per cap: 9.7 gallons

SPECIAL REPORT—Total beer shipments in Japan in 1981 were 4.6 million kl, or 1.2 billion gallons, a 2% increase over the previous year.

Beer shipments volume has been increasing steadily in Japan for the last five years. From 1976 to '77, shipments rose 13.2%; the increase slowed to 7.5% in 1978; shipments were up 1.0% in both '79 and '80.

Japan fifth

Among 50 countries tabulated for 1981, Japan ranks fifth in total beer production. The U.S. ranks first, then West Germany, the USSR and Britain. However, per capita consumption of beer in Japan lags far behind that of the other top producers.

In 1980, Japanese per capita consumption of beer was only 38.9 liters, or 9.7 gallons. West Germany led in this category with 36.4 gallons consumed per capita in 1980, the U.S. with 23 gallons and Britain with 29.2 gallons.

Statistics indicate there has been in Japan a great

(Continued on page 113)

Japanese alcoholic beverage consumption

1971:	Category:	1981:
47.5%	Japanese Sake	35.3%
9.6	Shochu Distilled White Spirit	9.2
26.9	Beer	30.6
11.2	Whisky/Other Spirit	20.0
4.8	Others	4.9
100.0	Total	100.0

Source: Yamasaki International

Copyright: Beverage Industry, November 19, 1982

Percent of beer production by Japanese breweries

Year:	Kirin: %	Sapporo: %	Asahi: %	Suntory: %
1976	63.8	18.4	11.8	6.0
1977	61.9	19.6	12.0	6.5
1978	62.1	19.6	11.6	6.7
1979	62.9	19.2	11.1	6.8
1980	62.2	19.6	11.1	7.1
1981	62.6	18.4	10.3	7.0

Source: Yamasaki International

Copyright: Beverage Industry, November 19, 1982

Japanese beer shipments

Year:	Shipment: kl	Increase: %
1977	4,153,124	13.2
1978	4,462,567	7.5
1979	4,508,460	1.0
1980	4,552,417	1.0
1981	4,645,621	2.0

Source: Yamasaki International

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Japanese beer

(Continued from page 112)

shift in consumption of alcoholic beverages during the 1970s. While Japanese sake consumption has decreased substantially in the decade, beer and whiskey has grown. In 1971, for example, sake accounted for 47.5% of Japanese alcoholic beverage consumption; in 1981, sake was down to 35.3%.

Beer consumption went from 26.9% of alcoholic beverage use in 1971 to 30.6% last year. Whiskey and other spirits rose from 11.2% to 20.0% in the decade. Shochu distilled wine spirit and other alcoholic beverages made up the remaining consumption. These two categories held steady at around 9.5% and 5% respectively in '71 and '81.

Beer production in Japan is limited to four licensed breweries who operate 33 plants throughout the country. Kirin has been the production volume leader for the past six years (as far back as our statistics show). Kirin has consistently accounted for at least 60% of Japanese beer production: last year the company's share was 62.6%.

Sapporo maintains about a 20% share of production; 18.4% in 1981, down from 19.6% the year before. Asahi commonly produces around 10% of Japanese beer volume; in 1981 the company accounted for 10.3%, its lowest volume share in the last six years.

Suntory's share of beer production last year was 7.0%, down only slightly from 1980. Suntory typically accounts for about 7% of total production.

Kirin, Sapporo and Asahi make their beer following German brewing technology; Suntory learned from Danish companies.

Beer market segmentation in Japan (offering super premium, premium, regular and light beers) is still in infant stages. Most of the beer sold in Japan is non-draft sold in individual 633 ml (about 22 oz.) brown bottles. Kirin is the only Japanese brewer with a light beer; sales are limited. Package draft beer, using ultrafiltration, has become more and more popular in Japan in recent years.

The standard package for the local market is the 633 ml bottle, which made up 60.7% of total beer sales in 1981, followed by 500 ml (17 oz.) bottles at 17.6%, 334 ml (about 12 oz.) bottles at 5.2%, 350 ml cans at 8.4% and bulk packaging at 7.7%.

In the last few years, all the Japanese breweries have introduced larger container sizes (1-L, 1.5-L, 2-L and 3-L) made of aluminum or PET to target the homemarket with draft beer and dispensing devices. Wide-mouth glass bottles and 10 oz. PET bottles have been introduced within the past year.

Imported beer to Japan reached the 16,613 kl (4.2 million gallon) level in 1981. This was 0.3% of total beer consumption. Imported beer volume has risen markedly; the 1981 figure is 51.8% higher than the year before. Consumption of imported beers in Japan has tripled in the last five years.

Budweiser, Olympia, Heineken, Henninger and Guiness were the top imported beers last year. Distribution of Budweiser is through Suntory; Guiness is sold through Sapporo. Both of these Japanese brewers are expected to start local production of these foreign brands soon, under license.

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Containers

(Continued from page 4)

ments were off 2.3% in the second quarter of '82 versus the same period in '81. Can shipments and plastic beverage bottle shipments were also down in the period. Stupay believes the third quarter of '82 will show similar results. He thinks major container companies will continue to stress cost reduction without changing pricing in the third quarter.

earnings

Most U.S. container companies reported lower earnings in the first half of 1982. Third quarter earnings, as well, should be down, compared to a year earlier. Nonetheless, while overall industry volume has been off for most of '82, not all producers have had their shipments decline. And several companies show reasonably good earnings potential.

glass volume

Overall glass container volume in the first half of 1982, was off 2%. Of that, shipments of beer containers were down 4%; liquor and wine bottles were down even more. Demand for glass bottles for soft drinks, though, rose modestly in the period. In the midst of all this, Ball Corporation, National Can's glass division and Owens-Illinois all managed to improve glass container shipments in the first half of '82.

Crown, Cork and Seal is losing sales this year because of reduced demand for steel beverage cans. The company's machinery operations have been hurt by high interest rates. It is responding by removing several can forming lines and switching to aluminum for beer and soft drink cans.

Can sales to the third quarter of '82 were up for Continental Group because of the firm's emphasis on 2-piece aluminum beer and soft drink cans. The company's earnings drop this year is primarily due, Stupay says, to weak pricing in PET beverage bottles.

Metal container income at Ball Corporation was off in the second quarter of this year due to soft pricing, although profit margins improved from the first quarter. Ball's glass operations, on the other hand, were very strong in the first half of this year, mainly because of better demand for glass for food containers, although the rise in demand for glass bottles for soft drinks also contributed.

(Continued on page 141)

Price Indexes

	June 1981	June 1982	% Change
Glass containers	335.3	357.4	6.6
Beer Bottle, Nonreturnable	269.6	283.1	5.0
Beverage Bottle, Returnable	338.5	367.9	8.7
Metal cans	317.3	332.7	4.9
Steel Cans, all end-uses	100.0	104.6	4.6
Aluminum Beer Cans	N/A	264.0	N/A
Aluminum Cans, all end-uses	100.0	107.1	7.1
Plastic bottles	127.7	129.0	1.0
Tin Plate, $ per base box	$31.32	$31.91	1.9
Aluminum can stock, $ per pound	$ .979	$ .990	1.1

1. Index 1967=100. 2. Index 6/81=100. 3. Index 12/70=100. 4. Index 6/78=100.

Source: Arthur Stupay, Prescott, Ball & Turben.

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Cans most affected by NYS bottle bill: Stupay

What will passage of New York State's forced deposit law do to beverage container shipments there?

Last year, soft drink sales in the state were estimated at 5.4 billion equivalent 12 oz. units, or 7.3% of national shipments, according to Arthur Stupay. Beer volume was about 3.7 billion units, or 7.2% of total U.S. volume.

Cans made up a good portion of the soft drink packaging mix in the state: 37% of packaged sales, which was above the national average. Cans were only 36% of the packaging mix for beer, below the national average of 60%. Most of the beer was sold in NR glass, but that container accounted for a very small portion of the soft drink packaging mix.

New York's bottle bill is scheduled to take effect July 1, 1983. It puts a 5 cent deposit on all beer and soft drinks sold in the state; it also permits a 1 cent per container handling fee for retailers, and it bans detachable pull tabs.

Stupay says that beverage consumption should drop off modestly for the first year the law is in effect. This is based on experience in other bottle bill states. Also, he says, can shipments during the first several months could drop significantly, perhaps by 50%. But, can use should pick up as consumers get used to the deposit system.

NR glass use will drop also, but not as much as cans. It is likely, Stupay says, that within 15 months to two years, both can and one-way bottle sales could be restored to pre-deposit law levels. This assumes the experience in New York mirrors that of Vermont.

New York State/national container shipments: 1981

Mil equiv. 12-oz. units	One-way glass	Cans
Beer	2,080	1,350
Soft drinks	936	2,023
Total N.Y. State	**3,016**	**3,373**
National shipments	29,117	56,326
N.Y. State % national	10.4%	6.0%

Source: Arthur Stupay, Prescott, Ball & Turben.

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In the plastic beverage bottle sector, Dorsey continues to be the most profitable company, according to Stupay. This is true, he says, even though unit volume of PET beverage bottles dropped a bit in the second quarter of '82, and should be lower again in the third. The reasons: success of 12-pack can sales probably hurt 2-L PET beverage bottle sales.

new products

Container companies are coming out with a variety of new products that Stupay believes could help spur demand. The Bureau of Alcohol, Tobacco and Firearms (BATF), is expected to allow PET for liquor and wine bottles. When this happens, Stupay thinks plastics will be used in the 1.75-L package for vodka, gin and domestic whiskies. Plastics for large-size wine bottles will follow.

.5-L PET beverage bottles are off to a slow start because of their high cost (estimated at $10 to $15 more per thousand than glass), limited shelf life and reported taste distortion. Another problem, Stupay points out, is that the bottle-making machinery reportedly doesn't produce at rated speeds, and yields are low. Container companies, as a result, have been focusing on improving machine operation. In the process, says Stupay, they may have developed a better product.

Next year, Continental Group will offer a 16 oz. reclosable aluminum can. The product was test-marketed this year. It does two things for the company: first, the product utilizes new technology in can-making from recycled aluminum sheet; second, it introduces a can container to the 16 oz./.5-L market, which is the fastest-growing soft drink size category. Continental says the "aluminum bottle" may cost about $75 per 1,000 units, using recycled aluminum for the cone-shaped top part.

Finally, in the arena of new products, Stupay says the can and beverage industries have scored big in 1982 by promoting 12-pack carriers for canned soft drinks, a concept already highly successful for beer. With promotional pricing, 12-packs are competitive with the 2-L package on a per ounce basis.

Comparing can materials costs, several companies that make both steel and aluminum cans now say that the aluminum cans are less expensive to produce. In addition, says Stupay, aluminum cans have recycling value.

Aluminum companies have established "tolling" arrangements where used beverage cans are accepted by the companies and new plate is provided in exchange, plus a processing charge. This results in a lower net cost of aluminum can stock (currently about 60 cents per pound after a scrap credit).

ABCR

(Continued from page 54)
beverage companies, raw material suppliers, and the front line entrepreneurial recyclers.

According to William E. Armgard, executive vice president of the organization, "ABCR's total mission will be to protect our nation's valu-solid waste while protecting our environment, conserve energy, promote the utilization of less costly materials, and the creation of jobs
(Continued on page 143)

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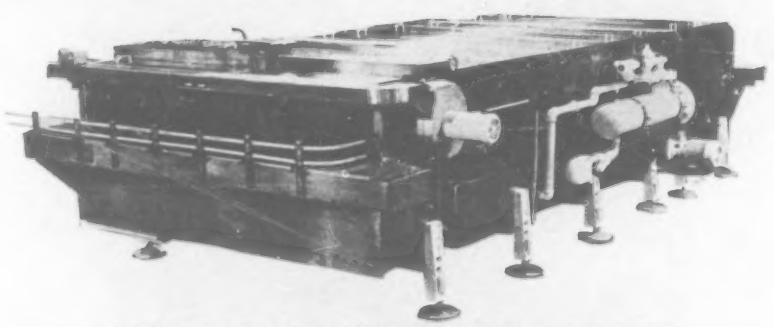

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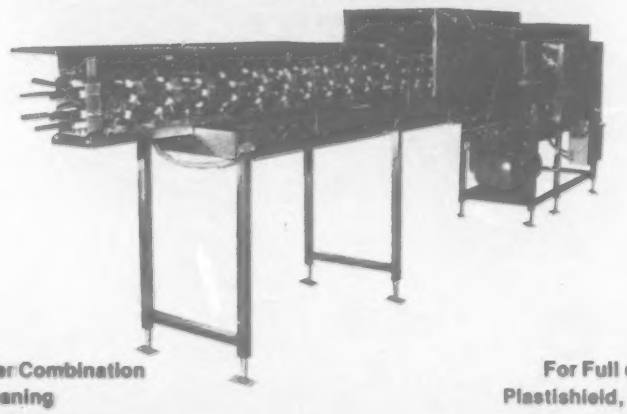

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Beverage Business Indicators

Glass container shipments

(thousands of gross)
(not seasonally adjusted)

	April '82	May '82	% change
Bottles	27,406	26,693	(2.6)
Beverage:			
refillable	366	441	14.3
nonrefillable	4,964	5,252	5.8
under 10 oz	97	109	12.4
10.0 to 15.9 oz	1,586	1,589	0.2
16.0 to 16.9 oz (includes .5-L)	2,913	3,223	10.6
17.0 to 33.9 oz (includes 1-L)	368	331	(10.0)
34.0 oz. and over (includes 2-L)	—	—	—
Beer:			
refillable	384	253	34.1
nonrefillable	9,119	9,462	3.8
under 11 oz	1,426	1,478	3.6
11.0 to 15.9 oz	7,150	7,382	3.2
16.0 and over	543	602	10.9
Liquor:	1,157	1,057	(8.6)
Under 125 ml (4.23 oz and under)	103	144	39.8
126 to 275 ml (4.24 to 9.3 oz)	280	232	17.1
276 to 500 ml (9.31 to 16.9 oz)	137	123	10.2
501 to 800 ml (16.91 to 27.04 oz)	240	210	(12.5)
801 to 1000 ml (27.05 to 33.80 oz)	248	213	(14.1)
1001 ml and over	149	135	(9.4)
Wine:	736	743	1.0
501 to 500 ml (4.24 to 16.9 oz)	132	156	18.2
501 to 800 ml (16.91 to 27.04 oz)	330	317	(3.9)
801 to 1000 ml (27.05 to 33.8 oz)	15	31	106.6
1001 to 1600 ml (33.81 to 54.08 oz)	141	137	(2.8)
Over 1600 ml (over 54.08 oz)	118	102	(13.5)

Source: U.S. Dept. of Commerce
Bureau of the Census

Closures for beverages

	May '82	June '82	% change
Metal (for spirits, wines)	58,930	43,307	(26.5)
Plastic (for spirits, wines)	115,652	143,921	24.4
Metal crowns (beer and soft drinks)	20,584	24,652	19.8
Soft drink (convenience types)	1,490	2,419	62.4
Soft drink (conventional types)	4,752	7,695	61.9
Beer (convenience types)	5,250	12,726	142.4
Beer (conventional types)	1,436	1,812	26.2
All other metal closures other than crowns	**6,108**	**6,587**	**7.8**

Source: U.S. Dept. of Commerce
Bureau of the Census

Imported beverages

(Proof gals)

	April '82	May '82	% change
Beer*	13,086,224	16,292,050	24.5
Whiskey	5,914,454	6,882,811	16.4
Brandy	389,682	486,033	24.7
Gin	359,224	465,559	29.6
Rum	71,000	39,195	(44.8)
Cordials and liqueurs	683,136	610,560	(10.6)
Others	548,803	621,096	(13.2)
Total	**21,052,523**	**25,397,304**	**20.6**
Sparkling wines	524,089	674,600	28.7
Still wines, table	7,515,613	8,860,949	17.9
Still wines, fortified	173,870	180,388	3.7
Vermouth	249,767	174,003	(30.3)

* Includes ale, stout, porter
Source: National Association of Beverage Importers, Inc

Selected Consumer Price Index

(The year 1967 equals 100)

	Dec. '81	Jan. '82	% change
Cola	295.7	302.4	2.3
Other carbonated soft drinks	137.2	141.9	3.4
Noncarbonated drinks	137.1	138.0	0.7
Wine	203.5	205.0	0.7
Beer and ale	238.0	232.2	(2.4)

Sweetener data

(Cents per pound, dry basis)

	Feb. '82	March '82	% change
HFCS wholesale prices			
California	16.90	16.90	0.0
New York	15.49	15.49	0.0
Chicago-West	14.08	14.08	0.0
Beet sugar wholesale prices	—	—	—
Dextrose wholesale prices			
California	28.64	28.64	0.0
New York	27.17	27.17	0.0
Chicago-West	27.17	27.17	0.0

Source: U.S. Dept. of Agriculture

Domestic beer removals

(Barrels of 31 gals)

	March '82	April '82	% change
Bottles and cans	13,725,844	13,821,767	0.7
Barrels and kegs	1,955,651	1,993,170	1.9
For export	218,990	232,709	6.3
Other	19,066	20,063	5.2
Total	**15,919,551**	**16,067,709**	**0.9**

Source: U.S. Dept. of the Treasury
Bureau of Alcohol, Tobacco and Firearms

Domestic wine removals

(Wine gals)

	March '82	April '82	% change
Still wines (bulk)	241,706	174,213	(27.9)
Still wines (bottled)	34,922,861	29,857,742	(14.5)
Effervescent wines (bulk & bottled)	1,928,411	1,615,591	(16.2)
Total	**37,092,978**	**31,647,546**	**(14.7)**

Source: U.S. Dept. of the Treasury
Bureau of Alcohol, Tobacco and Firearms

Domestic spirits removals

(Wine gals)

	Dec. '81	Jan. '81	% change
Whiskey	11,778,678	8,810,119	(25.2)
Brandy	1,363,333	1,282,291	(5.9)
Rum	2,113,819	1,753,988	(17.0)
Gin	2,576,594	3,003,870	16.6
Vodka	8,324,840	7,099,769	(14.7)
Cordials and liqueurs	2,732,618	2,368,685	(13.3)
Cocktails and mixed drinks	781,508	597,231	(23.6)
Total	**29,671,390**	**24,915,953**	**(16.0)**

Source: U.S. Dept. of the Treasury
Bureau of Alcohol, Tobacco and Firearms

Blow-molded plastic bottle production

(thousands of units)

	April '82	May '82	% change
Plastic bottles (blow-molded)	1,142,989	1,114,191	(2.5)
Carbonated beverages	169,138	187,222	10.7

Source: U.S. Dept. of Commerce
Bureau of the Census

Copyright: Beverage Industry, November 19, 1982

Production of fuel grade ethanol from soft drink bottling wastes

By **John Walker,** president,
Fermentec Corp., Los Gatos, CA

Editor's note: *This article is adapted from a presentation given at a recent meeting of the society of Soft Drink Technologists.*

This is a presentation of a system for producing fuel grade ethanol from bottling plant waste.

Work to develop this system began in mid-1980 with discussions between the management of Hygeia Coca-Cola Bottling Company, Pensacola, FL, and Fermentec, a fermentation process and system development company specializing in the conversion of food processing wastes into valuable products. We were asked to determine if it was technically and economically feasible to produce ethanol from soft drink bottling wastes.

After completion of a research program in our fermentation laboratories to establish the biological parameters of the fermentation, and after evaluating several possible engineering designs, we developed our CYBA (Cyclic Batch Alcohol) System production system.

The CYBA System was installed at the end of 1981 at Hygeia's plant and is now fully integrated and operating as part of daily routine.

Hygeia's major waste pollutant is BOD (Biological Oxygen Demand) from sugar syrup, which is a result of production losses estimated at .5% to 1% of the syrup processed, plus product contained in bottle returns and in containers of post-mix and pre-mix returns. Hygeia has been operating its own waste treatment system and was required to reduce BOD to 10 ppm prior to discharge. As the plant's production increased, the company was faced with probable increases in capital and operating costs of its waste treatment systems.

Simultaneously, local officials were encouraging the company to discontinue utilizing its own treatment system and instead to discharge into the newly completed municipal sewage plant. This option would require Hygeia to pay sewer service surcharges for BOD and other pollutants, and to become locked into future cost increases over which it would have little control.

Neither of these options was clearly desirable. It was a Hobson's choice at best.

Furthermore, over the past eight years fuel costs have risen dramatically and unpredictably, and fuel supplies have been interrupted. While we enjoy an oil surplus today, it is also clear that the basic causes of past fuel problems have not essentially changed, and the threat of future price increases, supply problems and rationing still exist.

The solution Hygeia chose was to install the Fermentec CYBA System. By selectively collecting the high sugar wastes, and feeding them to the CYBA System, overall plant BOD can be reduced by 80% to 85%. This allows Hygeia to stop operating its own waste treatment system and to discharge directly into the municipal sewage system, thus eliminating substantial operating costs and releasing several acres of land that were used for the waste treatment system. Also, this high BOD reduction can virtually eliminate BOD surcharges.

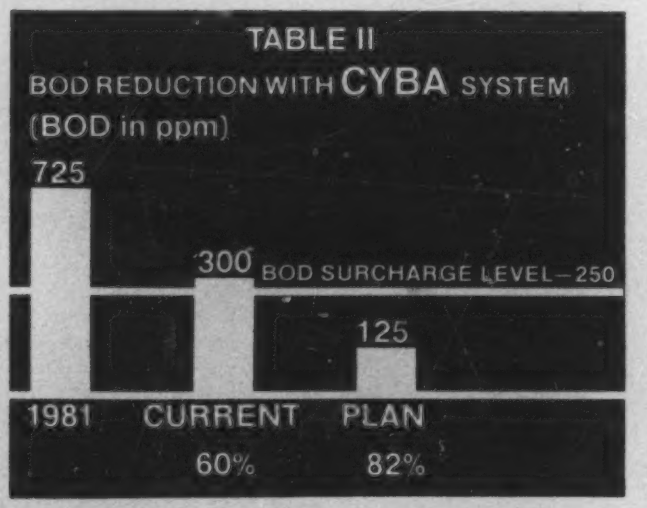
Furthermore, the CYBA System produces 190 proof fuel ethanol. Hygeia has decided to use this valuable product as a blend with gasoline to produce a gasohol-type fuel.

As a result of cost savings achieved in waste treatment and fuel costs, the CYBA System provides a healthy four-year payback at a 24% IRR (Internal Rate of Return). This is particularly attractive when compared to other alternatives mentioned above, neither of which is capable of producing any return on investment.

Table I

Average waste collection from major sources at Hygeia Coca-Cola Bottling Co.

Waste sources	Yield	% Sugar
Seamer	350 gal/day	10.5
Bottle washers	200 gal/wk	6-8
Pre-mix – post-mix returns	40 gal/day	10-50
Production rejects		
Can low fills	15 gal/day	10.5
Bottle failures	25 gal/wk	10.5
Snifts	20 gal/day	10.5
Q. C. Testing		
Can line	10 gal/day	10.5
Two bottle lines	10 gal/day	10.5
Washouts		
Carbo coolers, fillers, syrup lines	150 gal/day	6-30
Average	650 gal/day	10+ BRIX



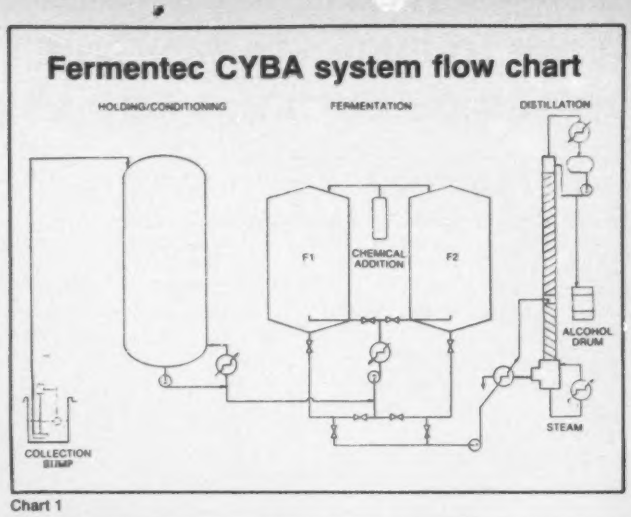


Chart 1

Table III

Ethanol value and uses

In-house uses:

Gasoline-ethanol blend (gasohol) at 90% unleaded regular, 10% ethanol

Value (per gallon of ethanol produced):

Replaces one gallon of gasoline	$1.20
Federal tax credit	.40
Florida state tax credit	.50
Total value	$2.10

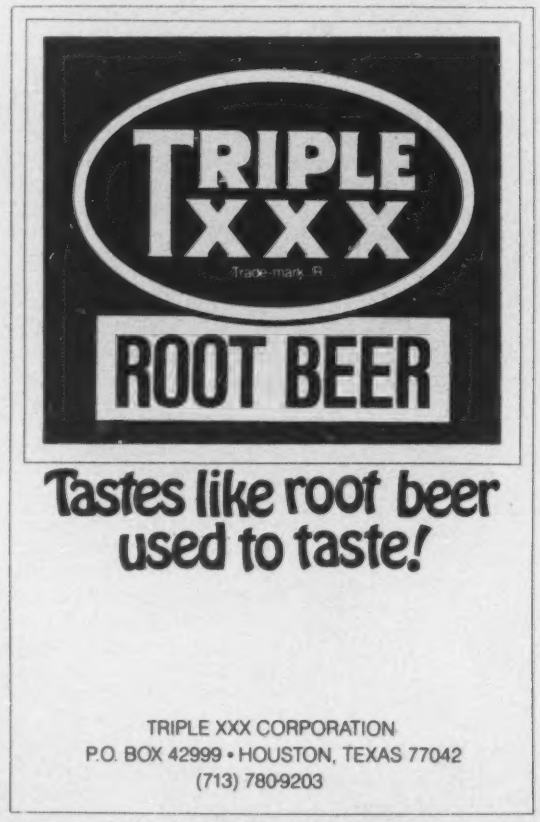
Other in-house uses:

- Direct fuel in modified gasoline vehicles
- Supplement in diesel vehicles to boost power, mileage
- Supplement as a boiler fuel

Outside markets may exist in local area

The initial steps Hygeia took in evaluating the application of the CYBA System was to conduct a thorough plant waste survey to identify and quantify all sources of high sugar waste (6% sugar

(Continued on page 160)



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Ethanol

(Continued from page 157)

or greater).

One of the major sources of waste is bottle returns. This waste is usually contaminated with bacteria, as well as other foreign matter, a consideration that was included in the system design.

Another major source of waste is the can line seamer. The amount of waste seen at any time is small, but with modern high-speed lines, it is constant, and amounts to a substantial waste problem over the operating day. This waste flow is also contaminated, but in this case with the lubricating oil used in the seamer.

Production rejects also account for another source of high strength waste. These rejects occur in the filling operating, in low can fills, and other such discrepancies.

Standard practice in the plant has called for operating personnel to dispose of rejected product directly to the floor drains. Quality control waste products were also routinely discarded to the drain. The results of the plant waste survey are shown in Table I., Average daily loading for all sources.

This survey indicated that the total high sugar waste streams would account for about 650 GPD (gallons per day) on an 8-hour basis, and that the expected sugar strength would be in excess of 10 Brix. It was particularly important to capture the very high strength pre-mix and post-mix returns, and the washouts from the carbocoolers, fillers and syrup lines, as seen in Table I.

On the basis of this survey it was determined that less than 1% of the total waste flow by volume contributes 90% to 95% of the BOD loading. The CYBA System was designed based on this survey.

The flow diagram of the System is shown in Chart I. It consists of four major elements. First, the collection system must be installed to segregate and selectively collect only the high sugar waste streams. The next section is the holding section where the wastes are stored awaiting transfer to the fermentors.

The fermentation system, the third section, consists of two equally-sized fermentors with adequate capacity to handle the maximum daily waste load during the summer season, in this case 1200 gallons, and to complete the fermentation in 24 hours. It is in the fermentors that the actual conversion from sugar to ethanol takes place.

When the fermentation is complete the contents are transferred to the distillation system to separate and collect high proof ethanol.

Now we'll discuss the various sections of the system in greater depth.

First, let's discuss the collection system. The results to be obtained from the CYBA System are only as good as the collection system. In this case let's paraphrase that old cliche of "garbage in - garbage out," to be "waste in - ethanol out," but the emphasis is the same.

Hygeia installed a collection tray at each filling machine. This consists of a small stainless steel tray with a plastic pipe draining the tray and taking the waste by gravity to a collection sump located nearby. This was done at both bottling lines and at the can line.

A tray was also attached underneath each syrup divert panel and is used to collect dribbles and line washouts. This site also serves as an in-plant collection point for rejects, in contrast to the previous practice of dumping the rejects directly to the floor drain. The contents of this collection tray also are piped to the collection sump.

For washouts of the carbo coolers, a line was installed under the floor drain. This underdrain system runs the length of the bottling room. Whenever an operator needs to wash out the machine, he attaches a hose to this under-

Table IV

Annual operating costs of CYBA system

Consumables:	
Inoculum	$ 2,100
Chemicals	200
Sub-total	$ 2,370
Utilities:	
Electricity (4.037¢/KWH)	$ 1,100
Steam (natural gas @ $4.20/1,000 ft.)	1,600
Sub-total	$ 2,700
Labor:	
2 Man-hours/batch	$ 1,900
Maintenance:	1,500
Total annual operating costs:	$ 8,400
Cost per gallon of ethanol:	$.60

Table V

Annual operating projections for the CYBA system

Revenues:	
Reduced sewage costs (128,00 #BOD @ $.09/#)	$ 11,000
Ethanol value (14,000 gals. @ $2.10)	29,400
Total revenues	$ 40,400
Operating costs:	$ (8,400)
Net operating margin	$ 32,000
Depreciation (A.C.R.S.—5 yrs.)	$(30,000)
Taxable income	$ 2,000
Tax—50% rate	$ (1,000)
After tax profit	$ 1,000
After tax cash flow:	
Net operating margin	$ 32,000
Tax	$ (1,000)
Total after tax cash flow	$ 31,000

Table VI

Return on investment for CYBA system

Installed cost of CYBA system		$150,000
Less: Investment tax credit (10%)	$15,000	
Energy Tax Credit (10%)	15,000	
Total tax credits		(30,000)
Total net investment		$120,000
Payback period		3.6 years
Internal rate of return		24%
Assumptions:		
8% inflation rate		
4.5% growth rate		

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drain system. The last section of the hose is clear so that the operator can visually check to determine when the initial high strength rinse is complete. At that point, he breaks the connection to allow the following low strength rinse water and wash water to flow directly to the drain and bypass the CYBA System. It is as important to minimize the collection of low sugar waste as it is to collect the high sugar waste.

Waste from the seamer is collected in the pan at the base of the seamer and is directly piped to the collection sump. The pre-mix and post-mix returns are dumped by the operator into another small stainless steel collection tray which drains into a container which is later dumped into the collection system.

The waste contained in bottle returns is collected in two ways. First, the bottle washer has a separate collection pan for the dump of the contents of the bottles prior to the initial rinse. This pan is then piped to the collection system. In addition, the operator of the bottle washers pulls the bottles with large amounts of product remaining in them from the line feeding the washer and dumps these wastes into a collection tank.

The collection sump is a stainless tank of approxiately 150 gallons. The wastes from the various sources throughout the plant go into this tank. It is equipped with a float valve so that when the liquid level rises to a pre-determined point, a small pump is activated transferring the conter.ts to the holding tank on the CYBA System.

Overall, the collection system, designed and installed by Hygeia personnel, is straightforward, simple, inexpensive, and most of all, highly effective in segregating and collecting the high strength waste streams.

At Hygeia the fermentors are on the right, in the center is the holding tank, and the distillation column is at the left. The entire system is skid-mounted to simplify installation at site. All is controlled by one weather-proof panel. Steam is used to heat the liquid for distillation. Cooling, when required, is achieved by recirculated, treated water.

The holding tank is a translucent figerglass tank sufficient to contain several days of production waste; in this case 3000 gallons. Temperature control is achieved by circulating the liquids through a regenerative heat exchanger, which also cools the ethanol produced in the still. The tank is equipped with level control probes to prevent over-filling or to prevent the level from falling below the point necessary for the recirculation loop. The tank has a volume marker on its side so the operator can read and record the tank volume and amount of waste collected on a daily basis.

A side benefit can be gained from this figure, which allows plant management to record the amount of waste produced and relate it directly to daily production operations, getting an even tighter control over production losses.

When the holding tank has at least 1200 gallons of waste, that amount is transferred to one of the insulated fermentors. The operator then inoculates the batch and allows the mixture to ferment for 24

(Continued on page 162)

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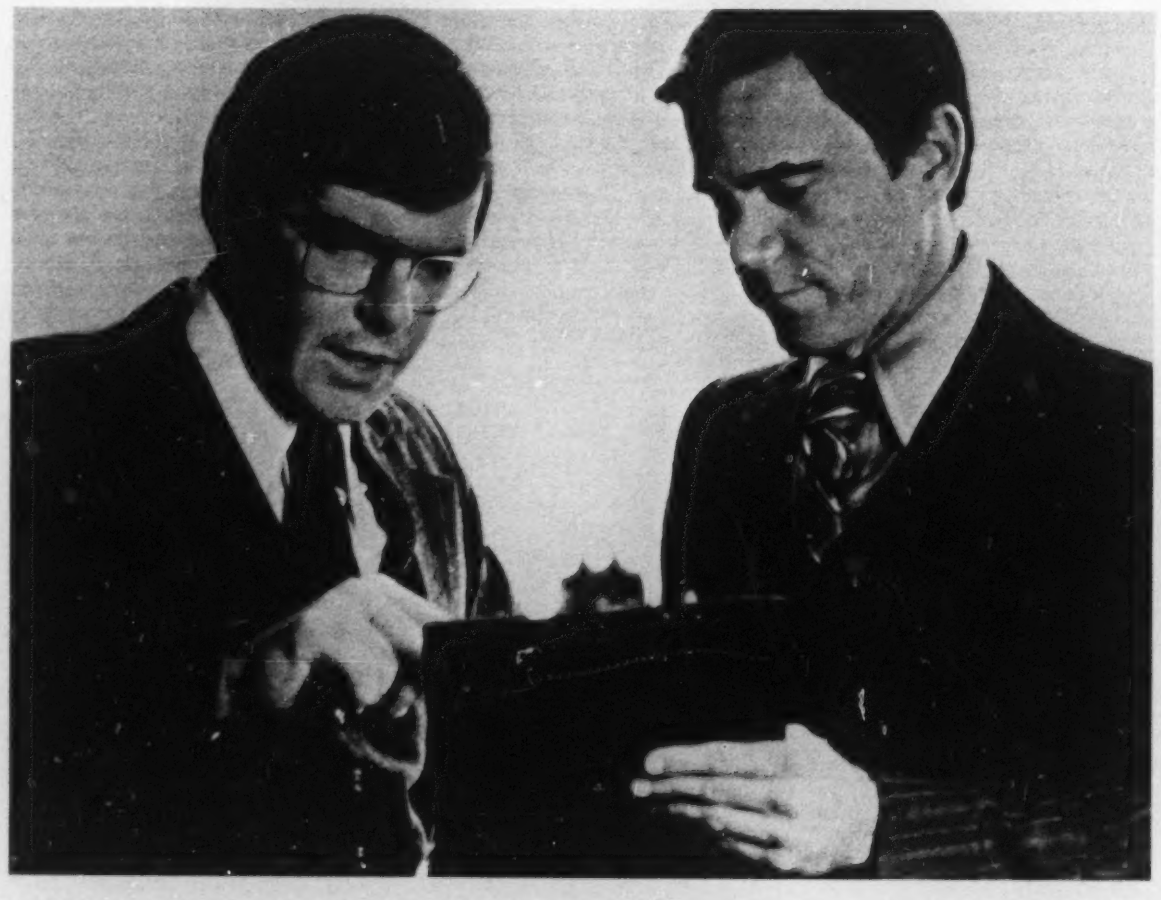

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hours. During that time the temperature is maintained and the fermentors are cooled to 90 to 95°F by circulating the "beer" through the heat exchanger.

Once the fermentation is complete, the contents of the fermentor are fed to distillation. While this is being done in the first fermentor, the second fermentor is beginning a new batch. Thus, the fermentors alternate so that one is always feeding the still while the other is in active fermentation.

The distillation system consists of a column, a feed heat exchanger, and a controlled steam supply. The incoming feed is substantially heated in the exchanger by the still bottoms. It then enters the feed section of this continuously operating still.

Feed enters the column approximately one third of the way up from the bottom. As the beer flows downward, the lower or "stripping section" removes the ethanol from the beer. As the vapors rise through the upper or "enriching" section the purity improves until it reaches 190 proof. The water keeps flowing down, the ethanol up.

As the vapors reach the top they are condensed and returned to a reflux drum mounted on the column. The proof control system monitors alcohol purity continuously. When 190 proof is obtained the valve opens and the ethanol is withdrawn to the storage drums. If the proof falls below 190, the valve is closed and the ethanol returns to the enriching section until the higher purity is achieved.

A hydrometer is used to check product purity. Laboratory analysis has shown the product to be 96.8% ethanol, 3.2% water, and less than .01% other.

The ethanol is stored in drums to be later mixed with gasoline, 500 gallons of ethanol to 4500 gallons of gasoline. Each drum is required to be marked with a warning. Denaturing, by mixing with gasoline, is required before the ethanol is permitted to leave the premises.

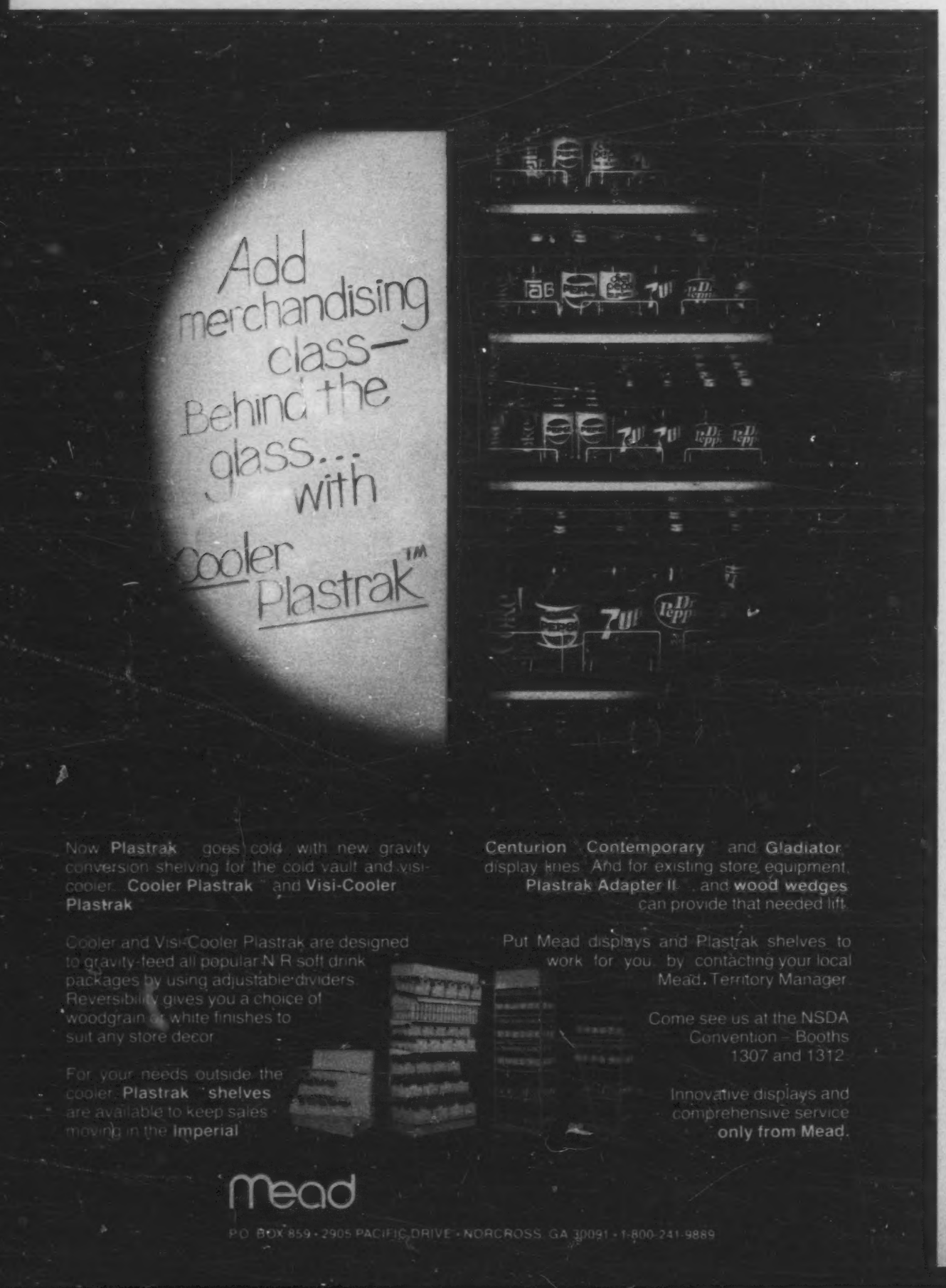
central control panel

The entire electrical system and most of the controls are operated from a central control panel. On the face of the panel are process flow graphics and controllers for fermentor temperature, product purity, and steam flow to the still.

The panel has a push button and pilot light for each of the pumps. There is also a light indicating that waste is being transferred from the holding tank to a fermentor. A selector switch allows the operator to "tell" the controls which fermentor is being filled. The actual switching is done manually.

There are three alarm lights in the panel indicating high level in the holding tank and the presence of high foam in the fermentors. Internally, process sequence is achieved by a programmable controller.

The results of the CYBA System at Hygeia thus far have been excellent. As shown in Table II, (see page 157) Hygeia's average BOD loading in 1981 before the CYBA System was installed was about 725 ppm.
system is only trapping about two thirds of the targeted waste flow, since all plumbing is not complete. However, at this level the planned BOD reduction across the CYBA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System has been in excess of 90%. When the remaining waste flows are fed to the CYBA System it is fully expected that the targeted level of 125 ppm BOD will be achieved.

Currently, based on about 450 gallons a day of waste collected, the System has achieved reduction to about 300 ppm, an overall plant BOD reduction of 60%. The System is producing about eight or nine batches per month. At the full level of production, when 650 gallons per day are collected, the number of batches operated per month will be about 12. At this higher collection level there will be a corresponding increase in BOD reduction and increase in quantity of ethanol produced.

At 125 ppm BOD, the plant's discharge will be substantially below the level at which surcharges begin. Not only does this avoid costly surcharges, but it provides an additional opportunity for plant personnel to reduce waste costs further by implementing a water reduction program without exceeding the surcharge level.

Table III (see page 157) shows Hygeia intends to use the ethanol as a fuel blend for its fleet use. The value of each gallon of ethanol is provided by a savings of a gallon of gasoline and by federal and state tax credits. The total value to Hygeia of each gallon of ethanol produced is $2.10.

There are other in-house uses for the ethanol, such as neat fuel used in modified gasoline vehicles, or as a fuel supplement in diesel vehicles. It can also be used as a supplemental boiler fuel.

While there may be local markets to which the product could be sold, the relatively small volume available and the excellent in-house opportunities make this a less desirable way to go.

As seen in Table IV, (See page 160) the cost to operate the CYBA System is about $8,400 per year. This amounts to a cost of only about $.60 per gallon of fuel ethanol produced.

The benefits of the CYBA of fuel ethanol produced.

The benefits of the CYBA System provide about $11,00 in reduced sewage costs and an ethanol value of almost $29,400, based on the production of 14,000 gallons per year, as shown in Table V. (See page 160) After deducting the operating costs of $8,400, the system produces a net operating margin of $32,000.

The five-year depreciation schedule provides an average $30,000 of depreciation expenses. The resulting tax (based on a 50% overall tax rate) is $1,000. The net operating margin after tax, is projected at $31,000 positive cash

(Continued on page 167)

About the Author

John C. Walker, president and founder of Fermentec Corp., Los Gatos, CA, has worked in the field of conversion of food processing waste to ethanol and high protein animal feeds for over five years. Walker served as president of Bio-Kinetics Inc., and as president of HDI (Hydrodynamics Design Inc.)

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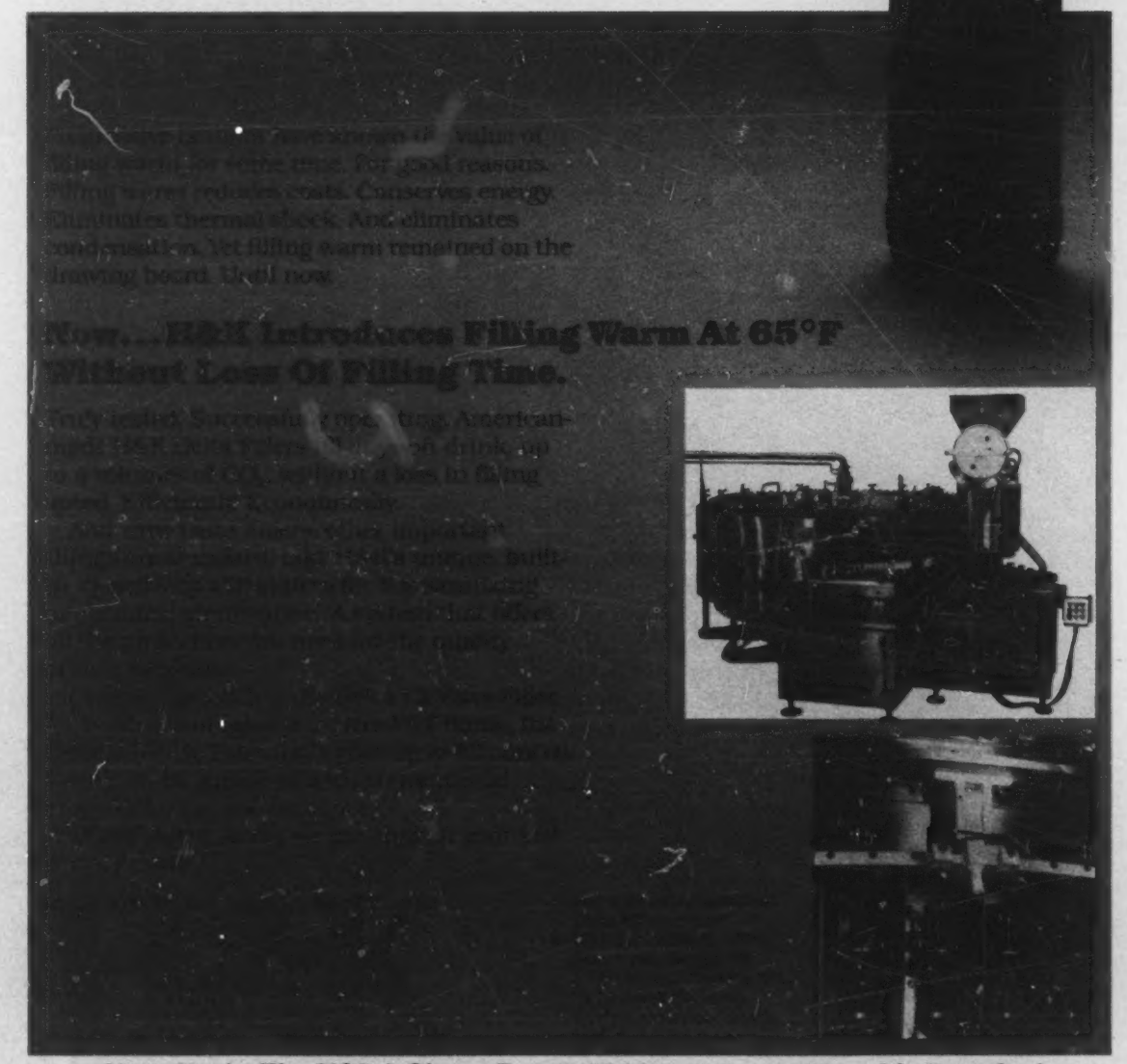

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Aluminum

(Continued from page 3)
screened consumers were shown the latest versions of the container or a number of optional designs, used them and evaluated their strengths and weaknesses, all under the watchful eyes of the research people. Over thirty separate focus groups were conducted and video-taped to permit the development staff to enhance the containers' strong points and eliminate the weaknesses.

Only when the "Clicker" seemed fully refined did the consumer research program go into the next step.

Continental set out to determine whether the container had the sales appeal to gain volume for the soft drink brand using the new container at the expense of competitive brands. Continental also wanted to determine if it could gain new markets for the container at the expense of competitive packages.

For this kind of testing, large numbers of consumers are needed to provide statistical significance, and the test format must be as close to the real brand selection process as conditions permit.

"We wanted consumers to tell us how they would react when they saw the container on the shelf rather than just what they like or dislike", explained Fenton. "Measures of behavior are more important at this stage than measures of attitude."

By showing consumers one brand in the new package in a full display of the soft drink section of a laboratory supermarket, the test developed the desired behavioral measures.

"By comparing consumers' normal brand and package selections to their planned behavior when the aluminum bottle is added to the mix, we got a good idea of its potential impact. We were fortunate to have a history of new package tests using this format (including both 2-L and 1.5-L PET), so we could determine how well we were doing compared to these earlier packages at a similar stage of development. The aluminum bottle got the best response of any package ever tested with this technique."

When the aluminum bottle was added to the package mix of one major cola, the competing brand inevitably lost substantial share. (See exhibit A).

The reasons for the brand switching are evident when we examined consumer preference between the Aluminum Bottle and competing packages. The Clicker, scored consumer preferences over Plasti-Shield returnable 16-oz. and .5-L PET.

Does all of this testing activity guarantee a successful new product? Task force leader Gresham says "no". We're going to continue to get new inputs from the consumer as we proceed with test markets and commercial introductions. To date, we have been gratified to discover that our customers' consumer testing is getting the same kind of good response our own people have found, but you can't entirely eliminate the risk of marketing failure. We feel we have done a good, thorough job within the limitations of testing techniques. We have maximized our chances by investment in research and hard work, but there is no such thing as a risk free innovation."

For more information on **Continental's Clicker Aluminum Bottle,** circle 350 on the reader service card.

Exhibit A: Brand Switching Attributed to the "Clicker" Aluminum Bottle

Cities	Share loss for brand competing w/Aluminum Bottle		
	Pre-Trial Share	Post-Trial Share	Switched to Clicker
Los Angeles	61%	34%	27%
Miami	49	28	21
Cherry Hill, NJ	44	26	18
Chicago	30	14	16
Gainesville, OH	35	29	6

Ethanol

(Continued from page 163)
flow annually.

The relation of this cash flow to investment, as shown in Table VI, (See page 160) is that the System provides about a 3.6 year payback. IRR is approximately 24%. These returns are attractive, but are even more exceptional when compared to the alternate means of waste treatment.

In summary, the Fermentec CYBA System at Hygeia substantially solves the waste treatment problem while simultaneously producing a valuable fuel grade ethanol.

First, the overall plant BOD can be reduced by 80% - 85%, based on a collection system that collects 90% of all sugar bearing wastes, and the CYBA System reducing the BOD of those wastes by 90%.

Secondly, the CYBA System produces 190 proof ethanol. While its primary use is to make a blended fuel for fleet use, this product may find other uses in-house as well.

Finally, the investment is sound financially. The 24% IRR is provided by sewer costs savings, fuel costs savings, and substantial initial and ongoing tax credits.

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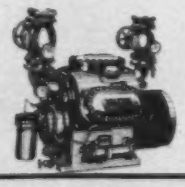

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